MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY

Permitting and Compliance Division
Water Protection Bureau
P.O. Box 200901
Helena, MT 59620-0901

Permit Fact Sheet
Montana Ground Water Pollution Control System (MGWPCS)

Applicant:	Seeley Lake Sewer District
Permit Number:	MTX000234
Facility Name:	Seeley Lake Sewer District Water Resource and Recovery Facility
Facility Location:	Northeast ¼ of Section 36, Township 17 North, Range 15 West; 47.1871° North Latitude and -113.4513° West Longitude; Powell County
Facility Address:	Proposed site is located two miles northeast of Seeley Lake, just south of Cottonwood Lakes Road and just west of the DNRC airport.
Facility Contact:	Amy Rose, Assistant Public Works Director Missoula County 6089 Training Drive Missoula, MT 59808 (406) 258-3723
Receiving Water:	Class I Ground Water
Number of Outfalls:	One
Outfall/Type:	001 – Subsurface Discharge Structure - Domestic Wastewater

I. PERMIT STATUS

The following fact sheet outlines the basis for issuing a new MGWPCS wastewater discharge permit to Seeley Lake Sewer District (applicant) for the Seeley Lake Sewer District Water Resource and Recovery Facility (facility) located near Seeley Lake, MT. The MGWPCS permit application and supplemental materials provide the information that serves as the basis for the development of the effluent limits and the monitoring requirements outlined within this fact sheet. The scope of this permitting action is for the construction, operation, and maintenance of the wastewater treatment and disposal system.

A MGWPCS permit application, and supplemental materials were received by the Montana Department of Environmental Quality (DEQ) on June 30, 2014 (DEQ, 2014). On July 31, 2014, DEQ received all applicable permit application fees and began the application review process. DEQ identified deficiencies in the MGWPCS permit application on August 15, 2014. DEQ received sufficient responses to all deficiencies and determined the application to be complete on October 09, 2014, pursuant to the requirements in the Administrative Rules of Montana (ARM) 17.30.1023.

In addition to the application for a MGWPCS permit, the applicant will need a plan and specification review and approval from DEQ pursuant to Title 75 and/or Title 76, Montana Code Annotated (MCA).

II. FACILITY INFORMATION

A. Facility Location

The proposed treatment and disposal site is 2 miles northeast of the town of Seeley Lake, located just south of Cottonwood Lakes Road and just west of the DNRC airport (Figure 1).

B. Facility and Operations

The proposed facility will serve as a centralized collection, treatment and disposal system for residents and businesses located within the Seeley Lake Sewer District. The facility may replace existing on-site septic tank and drainfield systems which currently serve the community.

The proposed facility will treat domestic wastewater originating from residential and commercial properties located in the district. DEQ recognizes that in comparison to the existing conventional septic systems, the proposed system may:

- Provide a higher level of treatment for nutrients;
- Provide treatment for pathogens and viruses; and,
- Provide an opportunity for abandonment of drainfields located in the valley bottom.

Additional information regarding the treatment system is further discussed below.

The raw wastes entering the proposed treatment facility are reported as being residential strength in nature. Screening and grit removal may take place at the head of the plant. The treatment system uses multiple treatment trains for all treatment processes, including aeration, biologic treatment, and clarification. The treatment system proposed is a Sequencing Batch Reactor (SBR) biological nutrient removal system that will treat nitrogen and phosphorous (Figure 3). SBRs are capable of producing an effluent that is of significantly higher quality when compared to effluent discharged from typical conventional treatment systems. Projected effluent characteristic data (Section II.D.) indicate that SBRs may provide twelve to 25 times more nitrogen removal than a conventional septic tank system (USEPA, 2002). On average, the proposed SBR system may discharge nitrogen at a concentration lower than applicable ground water quality standards (Appendix V).

The treatment system as proposed will include the construction of an ultraviolet (UV) disinfection system. The system will provide for treatment of pathogens and viruses (bacteria). In comparison, traditional conventional septic tank systems typically do not provide disinfection.

When treatment is complete, the treated effluent is decanted via floating decanters to an equalization basin. Some sludge will be sent either to a sludge digester or an aerated sludge holding tank. Sludge will be dewatered and stored with final disposal taking place within a DEQ licensed solid waste management system.

The treated effluent is discharged to a nearby set of subsurface discharge structures (Figure 2). The establishment of these disposal structures may in time result in abandonment of existing individual drainfields.

The overall project will result in a higher level treatment for nutrients, removal of pathogens and viruses, and relocation of existing discharges in the valley bottom. The table below provides a summary of the wastewater treatment and disposal system. A wastewater line diagram is included as Figure 3. Effluent characteristics as reported by the applicant are further discussed in Section II.D.

Treatment and Disposal System Summary Table	
Outfall 001 - Domestic Wastewater/Sewerage	
Method of Disposal: Infiltration to ground water	
Disposal Structure: Subsurface Discharge Structures (Outfall 001)	
SW1/4 of NE1/4 of Section 36, Township 17 N, Range 15 W	
Latitude: 47.1871° North; Longitude: -113.4513° West	
Average Daily Design Flow (gpd): 328,000	Daily Maximum Design Flow (gpd): 923,000
Effluent Sampling Location: EFF-001: composite sampler.	
Flow Monitoring Equipment: FM-001: TBD	
Flow Monitoring Location: FM-001: to be installed prior to discharge structures.	
Treatment: Sequencing Batch Reactor (SBR) biological nutrient removal system with UV disinfection.	

C. Effluent Sampling Location

The effluent sampling point will be established at the composite sampler (EFF-001) located just prior to discharge. DEQ recognizes EFF-001 as the optimum location to represent the nature of the monitored discharge prior to discharge. Sampling requirements are further discussed in Section V.

D. Effluent Characteristics

Pursuant to ARM 17.30.1023, DEQ requires the applicant to disclose the quality of the effluent to be discharged such that the potential pollutants can be identified and the proposed discharge can be examined to determine if it will cause pollution of state water, 75-5-605, Montana Code Annotated (MCA). The applicant provided effluent quality data for Outfall 001 as summarized within Appendix I.

E. Geology

The Seeley Lake area is characterized as gently dipping meta-sedimentary bedrock overlain by unconsolidated glacial and alluvial deposits (Norbeck, 1999). The local geology of the proposed discharge site is described as Pleistocene glacial outwash sediments bounded by glacial till deposits, both underlain by undifferentiated glacial deposits (Witkind, 1982).

F. Hydrogeologic Characteristics

Onsite lithology logs recorded by Great West Engineering, indicates that the wastewater discharge structure overlies a water bearing zone composed of coarse sand and gravel with silt (DEQ, 2014). The top contact of the water bearing unit is approximately 140 feet below ground surface (ft-bgs).

A potentiometric ground water contour map created by Great West Engineering using onsite monitoring wells reported that the ground water flow direction is primarily due south (S10°E) with seasonal fluctuations up to the south-east (S40°E). Regional ground water flow is immediately due south then trends south-west in parallel to the Trail Creek drainage (Norbeck, 1999).

Aquifer tests and measurements were completed by Great West Engineering using onsite monitoring wells (Section II.G.). Transmissivity was estimated using both Cooper-Jacob and Theis solutions resulting in a calculated transmissivity (T) of 20 $feet^2$/day. Hydraulic gradient (I) was estimated to be 0.0012 feet/feet. Hydraulic conductivity (K) was calculated to be 0.63 feet/day (DEQ, 2014). These measurements indicate that the water bearing zone may have a low ability to transmit water. A summary table is provided within Appendix IV.

G. Ground Water Monitoring Wells

Great West Engineering installed three onsite monitoring wells in 2012. All monitoring wells were constructed to be representative of the first water bearing zone (Section II.F.). The monitoring wells were positioned to surround the general vicinity of the proposed discharge structure (Figure 2). Information regarding these monitoring wells have been summarized and listed in Appendix II. Static water levels reported to DEQ may indicate potential confining conditions (DEQ, 2014). General monitoring well information is located in Appendix II.

H. Ground Water Quality Characteristics

The applicant reported ground water quality data from all three on-site ground water monitoring wells (Section II.G.). All samples were collected prior to construction of the proposed discharge structure. Ground water quality results indicate that the ground water is Class I pursuant to ARM 17.30.1006 (<1,000 µS/cm). Ground water quality results are summarized in Appendix III.

III. MIXING ZONE

The Montana Water Quality Act (75-5-103, Montana Code Annotated (MCA)) states that a mixing zone is an area of the receiving water, established in a permit, where the water quality standards may be exceeded. DEQ will not be authorizing a mixing zone within this permit. The mixing zone rationale is further discussed in Appendix IV.

IV. RATIONALE FOR PROPOSED DISCHARGE LIMITATIONS AND CONDITIONS

DEQ has a statutory duty to develop effluent limits and issue permits consistent with the Montana Water Quality Act, §75-5-101, MCA et seq. and rules adopted under that Act. Section IV presents the basis for discharge limitations in accordance with the requirements at ARM 17.30.1006, ARM 17.30.1031 and ARM 17.30.715. The bases for deriving and establishing effluent limitations and conditions are further discussed in Appendix V. Based on the information and analyses presented in Sections III and IV, pursuant to ARM 17.30.1031, DEQ proposes numerical effluent limitations for the following parameter:

A. Nitrogen

Application materials indicate that nitrogen parameters will be present in the proposed wastewater stream (Appendix I). The applicant has proposed a SBR treatment system that provides an advanced method for nitrogen treatment. A similar designed treatment system (MGWPCS program) has reported average total nitrogen concentrations on average of four mg/L which is lower than ground water quality standards (Appendix V). In comparison, systems using conventional treatment (e.g. septic tank) may discharge total nitrogen concentrations of approximately 40 to 100 mg/L (USEPA, 2002).

Based on the information and analyses presented in Appendix V and pursuant to 75-5-402, MCA; DEQ proposes the following numerical effluent limitations. The proposed final limitations are the most stringent applicable limitations for nitrogen.

Proposed Final Effluent Limits – Outfall 001			
Parameter	Units	Effluent Limitations	Rationale
		Daily Maximum[1]	
Nitrogen, Total (as N)	mg/L	7.5	Beneficial Uses: 17.30.1006(1)(b)(ii) Nondegradation Significance Criteria: ARM 17.30.715(1)(d)(iii)
Footnotes:			
(1) See definition in Part V of permit.			

V. RATIONALE FOR MONITORING AND REPORTING REQUIREMENTS

DEQ has a statutory duty to develop effluent limits and issue permits consistent with the Montana Water Quality Act, §75-5-101, MCA et seq. and rules adopted under that Act. ARM 17.30.1031 requires that all issued MGWPCS permits contain monitoring requirements that assure compliance with the developed numeric effluent limitations and therefore water quality standards. Effluent monitoring and ground water monitoring requirements will be required as a condition of this permit. Monitoring requirements and respective rationale is summarized in Appendix VII.

VI. SPECIAL CONDITIONS

Special conditions have not been established within this fact sheet.

VII. COMPLIANCE SCHEDULE

A compliance schedule has not been established within this fact sheet.

VIII. NONSIGNIFICANT DETERMINATION

DEQ has determined (DEQ, 2014) that the discharge constitutes a new source and is subject to Montana Nondegradation Policy (75-5-303, MCA; ARM 17.30.702). The applicable water quality standards for Class I ground water and nondegradation significance criteria are summarized in Appendix V. Discharges in compliance with the limitations of this permit constitute nonsignificant degradation. The permit includes monitoring, reporting and corrective action requirements to establish, confirm, and maintain compliance with the permit limits.

IX. PUBLIC NOTICE

Legal notice information for water quality discharge permits are listed at the following website: http://deq.mt.gov/notices/WQnotices.mcpx. Public comments on this proposal are invited any time prior to close of business on February 19, 2015. Comments may be directed to:

Barb Sharpe at bsharpe@mt.gov

or,

DEQ Permitting & Compliance Division
Water Protection Bureau
PO Box 200901
Helena, MT 59620

All comments received or postmarked prior to the close of the public comment period will be considered in the formulation of the final permit. DEQ will respond to all substantive comments pertinent to this permitting action and may issue a final decision within thirty days of the close of the public comment period.

All persons, including the applicant, who believe any condition of the draft permit is inappropriate, or that DEQ's tentative decision to deny an application, terminate a permit, or prepare a draft permit is inappropriate, shall raise all reasonably ascertainable issues and submit all reasonably available arguments supporting their position by the close of the public comment period (including any public hearing). All public comments received for this draft permit will be included in the administrative record and will be available for public viewing during normal business hours.

Copies of the public notice were mailed to the applicant, state and federal agencies and interested persons who have expressed interest in being notified of permit actions. A copy of the distribution list is available in the administrative record for this draft permit. Electronic copies of the public notice, draft permit, fact sheet, and draft environmental assessment are available at the following website: http://deq.mt.gov/notices/WQnotices.mcpx.

Any person interested in being placed on the mailing list for information regarding this permit may contact the DEQ Water Protection Bureau at (406) 444-3080 or email Barb Sharpe at bsharpe@mt.gov. All inquiries will need to reference the permit number (MTX000234), and include the following information: name, address, and phone number.

During the public comment period provided by the notice, the Department will accept requests for a public hearing. A request for a public hearing must be in writing and must state the nature of the issue proposed to be raised in the hearing (ARM 17.30.1373).

FIGURE 1

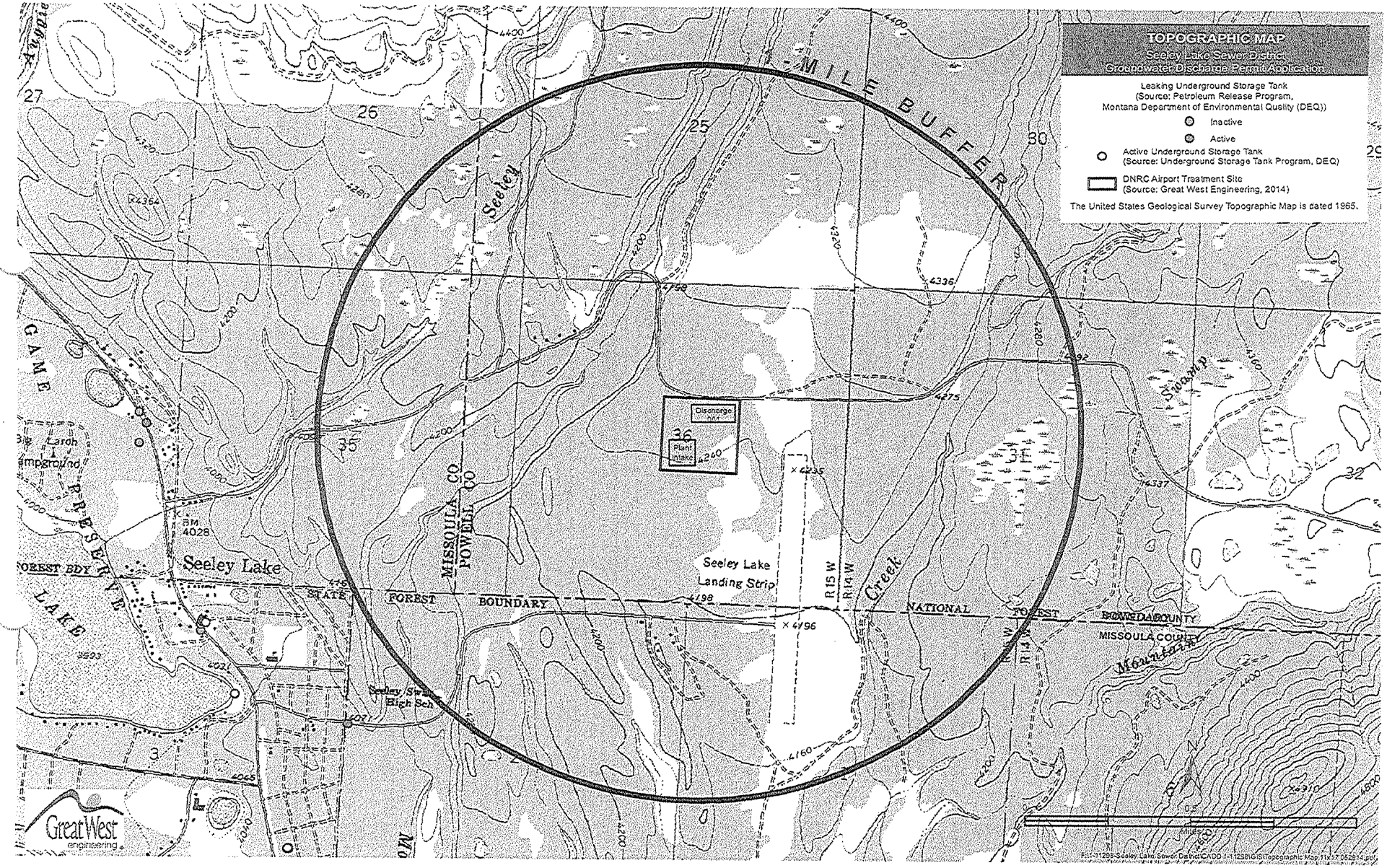
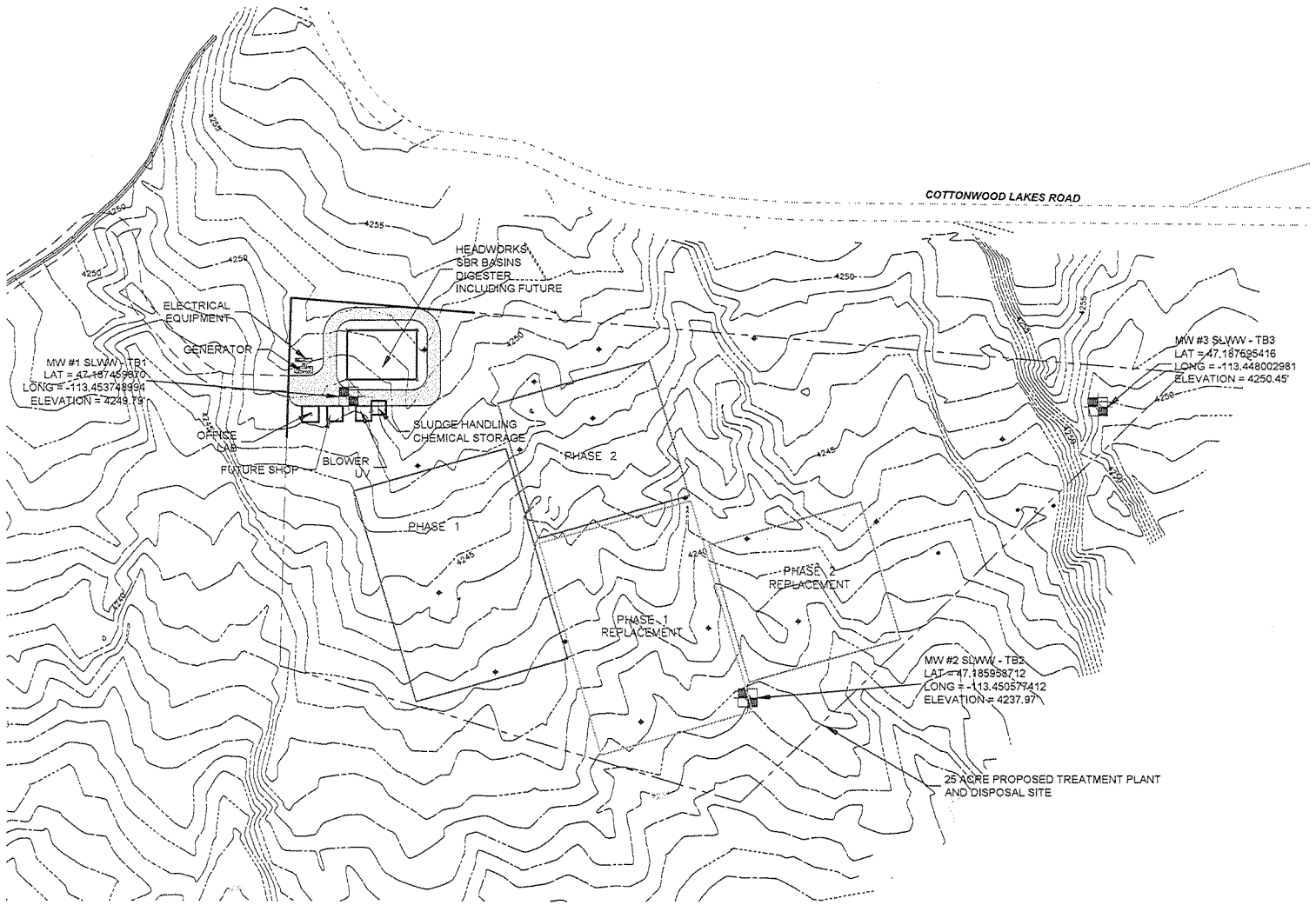

TOPOGRAPHIC MAP
Seeley Lake Sewer District
Groundwater Discharge Permit Application
Leaking Underground Storage Tank
(Source: Petroleum Release Program,
Montana Department of Environmental Quality (DEQ))
Inactive
Active
Active Underground Storage Tank
(Source: Underground Storage Tank Program, DEQ)
DNRC Airport Treatment Site
(Source: Great West Engineering, 2014)
The United States Geological Survey Topographic Map is dated 1965.
1-MILE BUFFER
Discharge
Plant Intake
Seeley Lake
Seeley Lake Landing Strip
STATE FOREST BOUNDARY
NATIONAL FOREST BOUNDARY
MISSOULA CO
POWELL CO
MISSOULA COUNTY
Seeley Creek
Swamp
GAME PRESERVE
Larch Campground
Seeley-Swan High Sch
BM 4028
R15W
R14W
GreatWest engineering

FIGURE 2



LEGEND

- MONITORING WELL
- FLOODED BASIN TEST
- TEST PIT

NOTE:
CONTOUR DATA BASED ON MISSOULA COUNTY SURVEY (JUNE 2012). ALL CONTOURS ARE AT 1' INTERVAL

0 100 200
SCALE IN FEET

PRELIMINARY V2
WATER RESOURCE AND RECOVERY FACILITY
SEPTEMBER 12, 2014

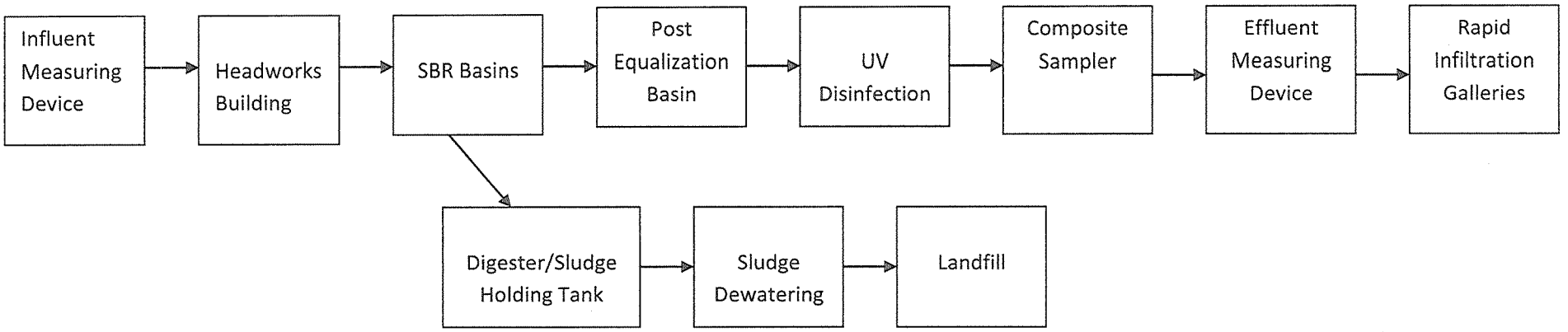
SEELEY LAKE SEWER DISTRICT

GreatWest engineering

F:\1-11298-Seeley Lake Sewer District\CADD 1-11298\Exhibits\1-11298 2014 Site Layout.dwg

FIGURE 3

Proposed Wastewater Treatment Flow Diagram



APPENDIX I - ESTIMATED EFFLUENT QUALITY

Estimated Effluent Quality – Outfall 001.						
Parameter[1]	**Units**	**Reported Minimum Value**	**Reported Average Value**	**Reported Maximum**[2] **Value**	**# of Samples**	**Source of Data**
Biochemical Oxygen Demand (BOD_5)	mg/L	2	4	21	66	RAE
Escherichia Coliform Bacteria	CFU/100ml	ND	2	20	60	RAE
Nitrogen, Nitrate + Nitrite (as N)	mg/L	0.1	1.4	4.6	66	RAE
Nitrogen, Total (as N)	mg/L	0.9	4.0	24.0	60	RAE
Nitrogen, Total (as N)	mg/L	-	7.5	7.5	-	App
Phosphorus, Total (as P)	mg/L	0.2	2.1	8.0	66	RAE

Footnotes:

CFU = Colony Forming Unit

App = Application Form GW-1; cited best professional estimates.

RAE = Application Form GW-1; cited Discharge Monitoring Reports from a similar design wastewater treatment plant, RAE Subdivision, MTX000117. Period of Record: 08/2009 through 07/2014.

(1) Conventional and nonconventional pollutants only, table does not include all possible toxics.

(2) Maximum value recorded of all monthly reported Daily Maximum Values.

APPENDIX II – MONITORING WELL SUMMARY

Monitoring Well Summary Table
Monitoring Well: MW-1
Lithological Log ID: SLWW-TB-1
Status: Constructed on 06/19/2012
Elevation: 4,249.79 feet above mean sea level
Location: West of drainfield and North of wastewater treatment facility.
Representation: Upgradient and potential candidate as the long term monitoring site representative of ambient receiving ground water quality for Outfall 001.
Latitude: 47.187459° North Longitude: -113.453749° West
Monitoring Well: MW-2
Lithological Log ID: SLWW-TB-2
Status: Constructed on 06/15/2012
Elevation: 4,237.97 feet above mean sea level
Location: Southern edge of infiltration galleries.
Representation: Downgradient from Outfall 001.
Latitude: 47.185959° North Longitude: -113.450577° West
Monitoring Well: MW-3
Lithological Log ID: SLWW-TB-3
Status: Constructed on 06/15/2012
Elevation: 4,250.45 feet above mean sea level
Location: East of infiltration galleries.
Representation: Sidegradient from Outfall 001.
Latitude: 47.187595° North Longitude: -113.448003° West

APPENDIX III - GROUND WATER QUALITY MONITORING RESULTS

Ambient Ground Water Quality Summary Table

Parameter	Units	Location[1]	Minimum Value	Average Value	Maximum Value	RL	# of Samples	Source of Data
Chloride (as Cl)	mg/L	MW-1, MW-2, MW-3	3	20	97	1	9	App
Escherichia coli Bacteria	CFU/100 ml	MW-1, MW-2, MW-3	<1	<1	<1	1	9	App
Nitrogen, Total Kjeldahl (TKN)	mg/L	MW-1, MW-2, MW-3	<1	<1	<1	1	9	App
Nitrogen, Nitrite+Nitrate (as N)	mg/L	MW-1, MW-2, MW-3	<0.05	<0.05	0.20	0.05	9	App
Organic Carbon, Total	mg/L	MW-1, MW-2, MW-3	0.9	1.4	2.3	0.5	9	App
pH	s.u.	MW-1, MW-2, MW-3	6.8	7.9	8.3	0.1	9	App
Specific Conductivity @ 25°C	µS/cm	MW-1, MW-2, MW-3	198	349	727	1	9	App
Total Dissolved Solids	mg/L	MW-1, MW-2, MW-3	120	210	430	10	9	App

Footnotes:

App = Application Form GW-2 and supplemental materials.

CFU = Colony Forming Units

Period of Record: September 2012 through December 2013, prior to discharge.

RL = Laboratory analyte reporting limit.

s.u. = standard units

(1) Refer to Appendix II of the Fact Sheet for the existing locations of the monitoring wells.

APPENDIX IV – MIXING ZONE RATIONALE

The Montana Water Quality Act (75-5-103, Montana Code Annotated (MCA)) states that a mixing zone is an area of the receiving water, established in a permit, where the water quality standards may be exceeded. Mixing zones are subject to the conditions imposed by DEQ and consistent with the rules adopted by the Board of Environmental Review (Board).

A mixing zone is not authorized by DEQ in this permit for the proposed discharge site. The applicant requested a mixing zone in the permit application submittal (DEQ, 2014). In determining whether a mixing zone is applicable for a proposed discharge, DEQ notes the following site specific conditions:

- Potential confining conditions (ARM 17.30.517(1)); and,
- The reported low volume of ground water available may not provide for dilution (ARM 17.30.517(1), ARM 17.30.506).

DEQ has determined that based on site specific conditions listed above and DEQ's consideration assessment of the following:

- General considerations in designation of a mixing zone (ARM 17.30.505);
- Water quality assessment (ARM 17.30.506); and,
- Specific restriction for ground water mixing zones (ARM 17.30.508);

DEQ will not be establishing a mixing zone for the proposed discharge in this permit.

Receiving Ground Water Information Table - Outfall 001		
Parameter	**Units**	**Value**
No mixing zone has been authorized		
Ambient Nitrogen Ground Water Concentrations	mg/L	0.05
Ground Water Flow Direction	azimuth/bearing	S10°E
Hydraulic Conductivity (K)	feet/day	0.63
Hydraulic Gradient (I)	ft/ft	0.0012
Volume of Ground Water Available for Mixing (Q_{gw})	ft^3/day	9.7

APPENDIX V - RATIONALE FOR PROPOSED DISCHARGE LIMITATIONS AND CONDITIONS

DEQ has a statutory duty to develop effluent limits and issue permits consistent with the Montana Water Quality Act, §75-5-101, MCA et seq. and rules adopted under that Act. Section IV presents the basis for discharge limitations in accordance with the requirements at ARM 17.30.1006, ARM 17.30.1031 and ARM 17.30.715.

A. Water Use Classification & Applicable Water Quality Standards

The receiving water is Class I ground water and high quality waters of the state (75-5-103, MCA). The quality of Class I ground water must be maintained so that these waters are suitable for the following beneficial uses with little or no treatment (ARM 17.30.1006):

- Public and private water supplies;
- Culinary and food processing purposes;
- Irrigation;
- Drinking water for livestock and wildlife; and,
- Commercial and industrial purposes.

Persons may not cause a violation of the following specific water quality standards in Class I ground water, pursuant to ARM 17.30.1006, except within a DEQ approved mixing zone as provided in ARM 17.30.1005:

- The human health standards for ground water listed in Circular DEQ-7;
- For concentrations of parameters for which human health standards are not listed in DEQ-7, no increase of a parameter to a level that renders the waters harmful, detrimental, or injurious to the beneficial uses listed for Class I water. DEQ may use any pertinent credible information to determine these levels; and,
- No increase of a parameter that causes a violation of the nondegradation provisions of 75-5-303, MCA.

The nondegradation rules (ARM 17.30.701, et seq.) implement Montana's nondegradation policy, which applies to any activity of man resulting in a new or increased source which may cause degradation (ARM 17.30.705). In accordance with ARM 17.30.706, the department is required to determine whether a new or increased source may cause degradation or whether it is nonsignificant according to ARM 17.30.715.

DEQ performed a significance determination for the proposed activity as part of permit development (DEQ, 2014). The determination established that the proposed discharge is a new or increased source (ARM 17.30.702) because it is an activity resulting in a change of existing water quality occurring on or after April 29, 1993. Discharges in compliance with the nondegradation significance criteria established within this permit, constitute nonsignificant degradation.

The applicable ground water standards pursuant to ARM 17.30.1006 and the nondegredation nonsignificant criteria at ARM 17.30.715 for the identified parameters are summarized in the table below and will be used as the basis for developing effluent limitations in the permit.

Applicable Ground Water Quality Standards.

Parameter[1]	Units	17.30.1006(1)(b)(i) Human Health Standards - Ground Water	17.30.1006(1)(b)(ii) Beneficial Uses - Ground Water	Pollutant Category[2]	17.30.715 Nondegradation Significance Criteria[3]
Nitrogen, Total (TN) Nitrogen, Nitrate + Nitrite (as N) Nitrogen, Nitrate (as N)	mg/L	10.0	10.0	T	7.5
Phosphorus, Total Inorganic	-	-	-	H	Surface water breakthrough time greater than 50 years[4]

Footnotes:

These standards establish the maximum allowable changes in ground water quality and are the basis for limiting discharges to ground water, ARM 17.30.1005(1); Circular DEQ-7 (2012), Footnote 16; and ARM 17.30.715(1)(d).

(1) Includes known pollutants only.

(2) Circular DEQ-7 (2012): Carcinogen (C), Harmful (H), and Toxic (T) parameter. Toxic pollutant with a Bioconcentrator (B) factor.

(3) Discharges in compliance with the nondegradation significance criteria constitute nonsignificant degradation.

(4) Changes in receiving ground water quality are not significant if water quality protection practices approved by DEQ have been fully implemented and if the listed significance criteria is met.

B. Pollutants and Parameters of Interest (POI's)

DEQ has identified pollutants and parameters of interest (POI's) for the proposed discharge based on the following:

- Reported effluent characteristics (Section II.D),
- Water quality standards (Appendix V),
- Water use classification of the receiving ground water (Appendix V), and,
- United States Environmental Protection Agency (USEPA) reference documents (Appendix VIII).

Each individual POI is further discussed below.

C. Development of Effluent Limits

ARM 17.30.1006 and 17.30.715 set forth the basis for developing effluent limitations that will protect water quality. The ground water quality standards establish the maximum allowable changes to ground water quality; are the basis for limiting discharges to ground water; and may only be exceeded within a mixing zone authorized by DEQ.

1) Water Quality Based Effluent Limitations

a. *Escherichia Coliform* Bacteria

The applicant will apply for plan and specification review by the DEQ Subdivision, Public Water, or State Revolving Fund (SRF) program. Application materials certified that the proposed system will include a UV disinfection unit designed to treat bacteria. Similar designed treatment systems (MGWPCS program) on average report low counts of bacteria after treatment (Appendix I).

Also, the system as planned proposes to discharge treated wastewater through subsurface discharge structures. The discharge structures may be systematically pressure-dosed (or aerated) which may minimize saturated conditions and maximize bacteria die-off rate in the natural sediments. Therefore, when approved and if properly sited and operated, the drainfield should remove most, if not all, of the pathogenic bacterial indicators beneath the drainfield's infiltrative surface (Woessner, 1998). Therefore, an effluent limit will not be established in this permit for bacteria.

b. Nitrogen

To protect beneficial uses [ARM 17.30.1006(1)(b)(ii)], there shall be no increase of a parameter to a level that renders the waters harmful, detrimental, or injurious to the beneficial uses. DEQ will establish the effluent limitations for nitrogen based on the projection that the entire nitrogen load in the wastewater stream will ultimately be converted to nitrate (USEPA, 2002a).

To protect beneficial uses (ARM 17.30.1006(1)(b)), and with no available dilution (Appendix IV), the most restrictive of the ground water human health standards and nondegradation nonsignificant criteria (listed above) will be used as the effluent limitation. The effluent limitation for nitrogen is displayed within Section IV.

c. Phosphorus

The nondegradation significance criteria set forth in ARM 17.30.715 state that the phosphorus concentration must be removed for a period of 50 years prior to discharge to any surface water. Phosphorus in wastewater is removed mainly through soil sorption processes, which vary based on soil composition. The 50-year breakthrough nondegradation criterion is based on the amount of soil available to adsorb the load of phosphorus from the wastewater source between the discharge points and the closest downgradient surface water. The implementation of a limitation, if needed, ensures that the quality of the effluent meets the nondegradation significance criteria developed to prevent the discharge of phosphorus to surface water.

A phosphorus breakthrough analysis (Appendix VI) was conducted by DEQ for Outfall 001 using information provided by the applicant (DEQ, 2014). The limiting layer depth will be

based on information submitted which indicates the ground water table occurs at approximately 140 ft-bgs. Best professional estimates, based on research, indicate that ground water flow direction likely parallels Trail Creek drainage (Section II.F.). However, for this analysis DEQ will conservatively assume (using seasonal ground water flow directions) the closest potential surface water body occurs at 4,000 feet. Using these conservative estimates as available, the phosphorus breakthrough analysis indicates that phosphorus discharged to ground water would not reach surface water from Outfall 001 in a significant amount of time. At the proposed discharge load, the phosphorus breakthrough is expected to occur in 291 years. A phosphorus breakthrough that would occur within 50 years would be considered significant (ARM 17.30.715). Because there will be no phosphorus breakthrough within 50 years, a limit for phosphorus will not be included within the proposed permit.

E. Final Effluent Limitations

Based on the information and analyses presented in Sections III and IV and pursuant to 75-5-402, MCA and ARM 17.30.1031, DEQ proposes the following numerical effluent limitations. The proposed final limitations are the most stringent applicable limitations for each individual parameter as developed in the previous sections. Effluent limits based on water quality standards are expressed as a daily maximum concentration. The proposed final effluent limits are listed in Section IV.

APPENDIX VI – PHOSPHORUS BREAKTHROUGH ANALYSIS

MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY (DEQ)

PHOSPHOROUS BREAKTHROUGH ANALYSIS

SITE NAME:	Seeley Lake Sewer District Water Resource and Recovery Facility		
COUNTY:	Powell County		
Permit #:	MTX000234		
NOTES:	Variables used are based on most conservative measurements		
	Design Capacity = 328,000 gpd		
	Located near the Seeley Lake/DNRC Airport		
VARIABLES	**DESCRIPTION**	**VALUE**	**UNITS**
Lg	Length of Primary Drainfield as Measured Perpendicular to Ground Water Flow	768	ft
L	Length of Primary Drainfield's Long Axis	704	ft
W	Width of Primary Drainfield's Short Axis	300	ft
B	Depth to Limiting Layer from Bottom of Drainfield Laterals*	134	ft
D	Distance from Drainfield to Surface Water	4000	ft
T	Phosphorous Mixing Depth in Ground Water (0.5 ft for coarse soils, 1.0 ft for fine soils)**	0.5	ft
Ne			
Sw	Soil Weight (usually constant)	100	lb/ft3
Pa	Phosphorous Adsorption Capacity of Soil (usually constant)	200	ppm
#I	Number of proposed wastewater treatment systems	1	
CONSTANTS			
PI	Phosphorous Load per proposed wastewater treatment system	2097	lbs/yr
X	Conversion Factor for ppm to percentage (constant)	1.0E+06	
EQUATIONS			
Pt	Total Phosphorous Load = (PI)(#I)	2097	lbs/yr
W1	Soil Weight under Drainfield = (L)(W)(B)(Sw)	2830080000	lbs
W2	Soil Weight from Drainfield to Surface Water	223600000	lbs
	= [(Lg)(D) + (0.0875)(D)(D)] (T)(Sw)		
P	Total Phosphorous Adsorption by Soils = (W1 + W2)[(Pa)/(X)]	610736	lbs
SOLUTION			
BT	**Breakthrough Time to Surface Water = P / Pt**	291	years

BY:	Chris Boe
DATE:	November 17, 2014
NOTES:	** Depth to limiting layer is typically based on depth to water in a test pit or bottom of a dry test pit minus two feet to account for burial depth of standard drainfield laterals.*
	*** Material type is usually based on test pit. A soil that contains more than 35% silt and clay sized particles is considered fine grained.*

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APPENDIX VII – RATIONALE FOR MONITORING AND REPORTING REQUIREMENTS

ARM 17.30.1031 requires that all issued MGWPCS permits contain monitoring requirements that assure compliance with the developed numeric effluent limitations and the water quality standards. Effluent monitoring and ground water monitoring requirements will be required as conditions of this permit.

A. Effluent Monitoring - Compliance

Final numeric effluent limitations are developed for this permit with specific magnitudes and durations based on site-specific conditions that ensure the discharge will not cause or contribute to an exceedance of an applicable water quality standard (see Sections III and IV). Accordingly, the permittee will be required to monitor and report monitoring results at a specified frequency in order to demonstrate compliance with the applicable effluent limitations. Effluent monitoring and reporting requirements are summarized in the table below. Analytical methods for each monitored parameter must be in accordance with the Code of Federal Regulations, 40 CFR Part 136.

B. Effluent Monitoring - Sampling Location

Samples shall be representative of the nature of the monitored discharge (Permit Part II.A.). As discussed in Section II.C, the effluent sample location has been established at the composite sampler (EFF-001). DEQ recognizes EFF-001 as the optimum location to represent the nature of the monitored discharge prior to discharge.

C. Discharge Monitoring

Measurements shall be representative of the volume of the monitored discharge (Permit Part II.A.). The applicant will be required to install, maintain and report flow measurements using a flow-measuring device capable of measurements that are within 10 percent of the actual flow (Permit Part II.B.). The flow measuring device (FM-001) is to be installed prior to the discharge structure (Figure 3). The flow measuring device must be installed and in operating condition prior to discharge. Flow monitoring and reporting requirements are summarized in the table below.

Effluent Monitoring and Reporting Requirements – Outfall 001

Parameter/Method	Monitor Location	Units	Sample Type[1]	Minimum Sample Frequency	Reporting Requirements[1][2]	Report Freq	Rationale
Flow Rate, Effluent[3]	FM-001	gpd	Contin-uous	Contin-uous	Daily Maximum Monthly Average	1/Quarter	Effluent Characterization
Nitrogen, Nitrite+Nitrate (as N)	EFF-001	mg/L	Grab	1/Month	Daily Maximum Monthly Average	1/Quarter	Permit Compliance
Nitrogen, Total Ammonia (as N)	EFF-001	mg/L	Grab	1/Month	Daily Maximum Monthly Average	1/Quarter	Permit Compliance
Nitrogen, Total Kjeldahl (TKN)	EFF-001	mg/L	Grab	1/Month	Daily Maximum Monthly Average	1/Quarter	Permit Compliance
Nitrogen, Total (as N)[4]	EFF-001	mg/L	Calculated	1/Month	Daily Maximum Monthly Average	1/Quarter	Permit Compliance

Footnotes:
EFF-001: effluent sample location, composite sampler (or nearby sump, or nearby sample port).
FM-001: flow meter to be installed prior to discharge structures.
If no discharge occurs during the reporting period, "no discharge" shall be documented on the effluent DMR report forms.
Parameter analytical methods shall be in accordance with the Code of Federal Regulations, 40 CFR Part 136, unless specified above.
(1) See definitions in Part V of the permit.
(2) Daily Maximum: Report highest measured daily value for the reporting period on Discharge Monitoring Report (DMR) form.
(3) Requires recording device or totalizing meter, must record daily effluent volume.
(4) Total Nitrogen is the sum of Nitrate + Nitrite and Total Kjeldahl Nitrogen.

D. Ground Water Quality Monitoring

Ground water monitoring will be established for the upcoming permit cycle. The ground water monitoring wells established in 2012 (Section II.G.) shall be maintained and monitored during the term of the permit cycle. Ground water monitoring and reporting requirements are summarized in the table below. All analytical methods must be in accordance with the Code of Federal Regulations, 40 CFR Part 136 for each monitored parameter.

Ground Water Monitoring and Reporting Requirements, Separately							
Parameter/Method	Monitor Location[1]	Units	Sample Type[2]	Minimum Sampling Frequency	Reporting[2] Requirements	Reporting Frequency	Rationale
Nitrogen, Nitrite+Nitrate (as N)	MW-1, MW-2, MW-3	mg/L	Grab	1/Quarter	Quarterly Average	1/Quarter	Mixing Zone Determination Permit Renewal
Nitrogen, Total Ammonia (as N)	MW-1, MW-2, MW-3	mg/L	Grab	1/Quarter	Quarterly Average	1/Quarter	Mixing Zone Determination Permit Renewal
Nitrogen, Total Kjeldahl (TKN)	MW-1, MW-2, MW-3	mg/L	Grab	1/Quarter	Quarterly Average	1/Quarter	Mixing Zone Determination Permit Renewal
Static Water Level (SWL)[3]	MW-1, MW-2, MW-3	ft-bmp	Instant-aneous	1/Quarter	Quarterly Average	1/Quarter	Mixing Zone Determination Permit Renewal
Static Water Level (SWL)	MW-1, MW-2, MW-3	ft-msl	Calculated	1/Quarter	Quarterly Average	1/Quarter	Mixing Zone Determination Permit Renewal
Footnotes:							
ft-bmp = feet below measuring point							
ft-msl = feet above mean sea level							
At no time shall the permittee mark or report "no discharge" on any monitoring well DMR form.							
Parameter analytical methods shall be in accordance with the Code of Federal Regulations, 40 CFR Part 136, unless specified above.							
(1) Refer to Section II.G. of the Fact Sheet for the existing locations of the monitoring wells.							
(2) See definitions in Part V of the permit.							
(3) Point of reference will be from the established measuring point and measured to within 1/100th of one foot.							

APPENDIX VIII - REFERENCES CITED

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Administrative Rules of Montana, Title 17, Chapter 30, Water Quality:

- Subchapter 2 - Water Quality Permit Fees.
- Subchapter 5 – Mixing Zones in Surface and Ground Water.
- Subchapter 7 – Nondegradation of Water Quality.
- Subchapter 10 – Montana Ground Water Pollution Control System.
- Subchapter 13 – Montana Pollutant Discharge Elimination System.

Department of Environmental Quality, Water Quality Circulars:

- Circular DEQ-2 – Design Standards for Wastewater Facilities.
- Circular DEQ-4 – Montana Standards for On-Site Subsurface Sewage Treatment Systems.
- Circular DEQ-7 – Montana Numeric Water Quality Standards.

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Prepared By: Chris Boe, December 05, 2014